

S/N 10/ 720,409
Applicant Feng Chen
Reply to the Office action (#2) dated 04 Nov 2005

Page 9
Attorney Docket: CS03-039

Remarks/Arguments

Examiner Shakeri is thanked for the thorough Office Action.

In the Claims

Claim 12 is amended to provide proper antecedent basis for the "rounded bottom corners".

Applicant respectfully requests entry of these amendments.

No new matter is added.

CLAIM REJECTIONS:

Rejection of Claims 1,5,9,12,13,14,15,19,22-24,26,30-32,34 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kajiwara et al

The rejection of Claims 1,5,9,12,13,14,15,19,22-24,26,30-32,34 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kajiwara et al is acknowledged. Reconsideration and withdrawal is respectfully requested in view of the amendments to the claims and following remarks.

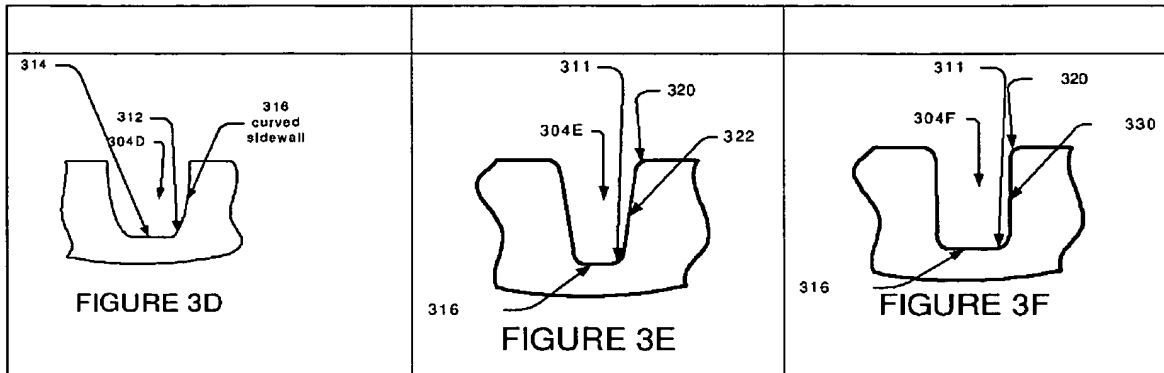
Review of Applicant claimed embodiments.

Parent claims 1, 14 and 30 contain the non-obvious limitations: "said groove is comprised of: sidewalls, a flat bottom, rounded bottom corners between said sidewalls and said flat bottom."

Non-limiting examples embodiments for these claims are shown below in figures 3D, 3E and 3F.

S/N 10/ 720,409
 Applicant Feng Chen
 Reply to the Office action (#2) dated 04 Nov 2005

Page 10
 Attorney Docket: CS03-039



None of the cited references suggest applicant's

(1) flat bottom (e.g, 314, 316) and

(2) rounded bottom corners (e.g., 312 311).

See spec pp. 13 and 14. The rounded bottom corner help prevent slurry particles from sticking in the corners between the flat bottom and the sidewalls. See e.g., figure 2B. See Spec. p. 11, L 14-16.

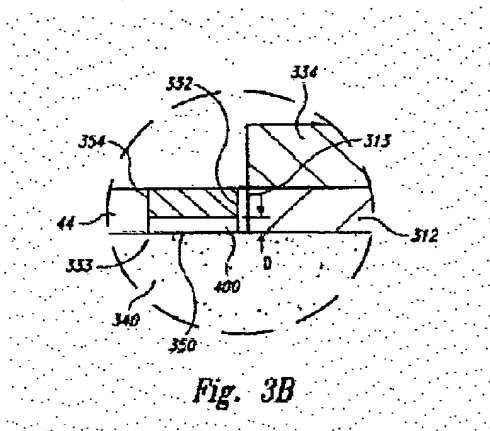
The dependent claims add further non-obvious limitations including the shape of the sidewalls.

Reference Taylor 335.

Taylor teaches rectangular groove with 90 degree non-rounded bottom corners. See Taylor fig 3B. Taylor teaches against the claimed embodiments.

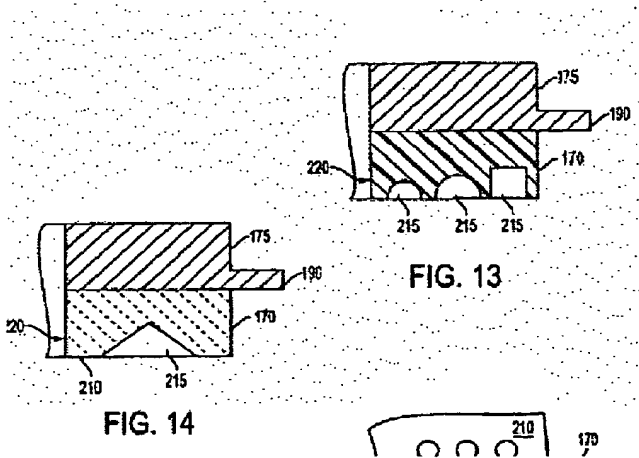
S/N 10/ 720,409
Applicant Feng Chen
Reply to the Office action (#2) dated 04 Nov 2005

Page 11
Attorney Docket: CS03-039



Reference Kajiwara et al. 327

Reference Kajiwara et al. 327 teaches semicircular grooves, rectangular grooves and triangular grooves. See figures 13 and 14.



Kajiwara teaches against the claimed embodiments.

S/N 10/ 720,409
Applicant Feng Chen
Reply to the Office action (#2) dated 04 Nov 2005

Page 12
Attorney Docket: CS03-039

patent Claims 1 and 14 and 30 are non-obvious

Claim 1 states:

1. (PREVIOUSLY PRESENTED) A CMP retaining ring, comprising:
an inner peripheral surface;
an outer peripheral surface;
a lower surface adapted to contact and depress an upper surface of a polishing pad during chemical mechanical polishing of a lower surface of a substrate;
at least a groove on said lower surface of said retaining ring; and said groove extending from a position at or adjacent said inner peripheral surface of said retaining ring, to a position at or adjacent said outer peripheral surface of said retaining ring;
at least a portion of said groove has a rounded contour or slanted contour; said groove is comprised of: sidewalls, a flat bottom, and rounded bottom corners between said sidewalls and said flat bottom.

Claims 1, 14 and 30 to include at least the following non-obvious limitation.

said groove is comprised of: sidewalls, a flat bottom, and rounded bottom corners between said sidewalls and said flat bottom.

Claims 1 and 14 and 30 are non-obvious over the references because no references or combination of references suggests the limitation of "said groove is comprised of: sidewalls, a flat bottom, and rounded bottom corners between said sidewalls and said flat bottom."

For example, neither Kajiwara '327 nor Taylor suggests or shows a groove comprised of rounded bottom corners and a flat bottom. See e.g., Kajiwara '327 figures 5, 7, 9, 10A to 15B. Also see Taylor figure 3B.

No reference suggests the problem (of the slurry particles accumulating in the groove) applicant's rounded bottom corner solves. Therefore there is no motivation to combine the references to meet the claims.

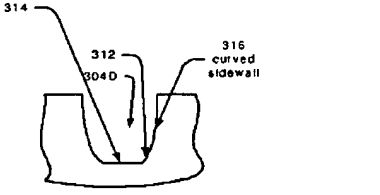
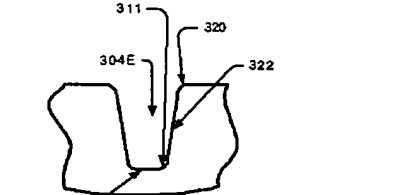
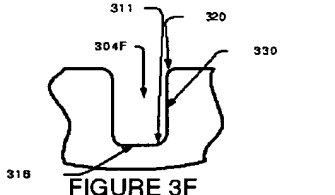
S/N 10/ 720,409
Applicant Feng Chen
Reply to the Office action (#2) dated 04 Nov 2005

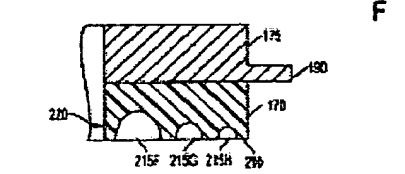
Page 13
Attorney Docket: CS03-039

The office action posits that:

Kajiwara et al. discloses, e.g., 09:50-54 or 09:61-63 that the shape and size of the groove may be changed to accommodate different properties of the pad and/or to reduce the rebound effect, it further discloses the preferred embodiment of the instant application, i.e., Figs. 3B, 3C (instant application page 13, lines 7 and 8). It would have been obvious to one of ordinary skill in the art to modify the shape by providing a flat bottom to accommodate different polishing pads.

Below compares some non-limiting embodiments

Applicants claimed examples		
 <p>FIGURE 3D</p>	 <p>FIGURE 3E</p>	 <p>FIGURE 3F</p>

Kajiwara – figure 12 shows only hemispherical shaped grooves
 <p>FIG. 12</p>

S/N 10/ 720,409
Applicant Feng Chen
Reply to the Office action (#2) dated 04 Nov 2005

Page 14
Attorney Docket: CS03-039

It is not obvious to motivation to modify Kajiwara to meet applicant's parent claims

It is not obvious to motivation to modify Kajiwara to meet applicant's parent claims because there is motivation. Nothing in Kajiwara suggest applicant's flat bottom with rounded bottom corners. Furthermore, Kajiwara is complete and does not suggest modification.

The office action argues that Kajiwara et al. 09:50-54 or 09:61-63, suggests modifying Kajiwara grooves to meet applications claims. However, Kajiwara does not suggest applicant's claimed groove shapes. Kajiwara merely states that the groove shape can be changed to accommodate different polish pad or can be changed to change the rebound effect.

Without further direction or suggestion an infinite number of shaped grooves could be made. There are different goals than applicant grooves achieve therefore it would be random chance if Kajiwara meet applicant's claims.

Because of the completely difference goals between Kajiwara 09:50-54 or 09:61-63, and the applicant. There is no motivation to modify Kajiwara to meet applicant's parent claims.

Moreover, only with hindsight can Kajiwara meet applicant's claims for no where does Kajiwara mention applicant's claimed flat bottom and rounded bottom corners.

Kajiwara teaches against applicant claimed groove shape

Kajiwara shows many example grooves in Kajiwara figs 9 thru 15B. All these teach away from applicant's claimed grooves.

Claims 1, 13 and 30 have similar limitations and are non-obvious.

Therefore claims 14 and 30 are non-obvious for the reason stated above with respect to claim 1.

S/N 10/ 720,409
Applicant Feng Chen
Reply to the Office action (#2) dated 04 Nov 2005

Page 15
Attorney Docket: CS03-039

Rejection of Claims 1, 5, 9, 12, 13, 14, 15, 19,22-24, 26, 30-32, 34 and 36 under 35 U.S.C. 103(a) as being unpatentable over Kajiwara et al. in view of Chen et al. (6,656,019).

The rejection of claims 1, 5, 9, 12, 13, 14, 15, 19,22-24, 26, 30-32,34 and 36 under 35 U.S.C. 103(a) as being unpatentable over Kajiwara et al. in view of Chen et al. (6,656,019) is acknowledged. Reconsideration and withdrawal of the rejection is respectfully requested in view of the amendments.

As discussed above, the parent claims 1, 14 and 30 have the following limitations not suggested by Kajiwara.

said groove is comprised of: sidewalls, a flat bottom, and rounded bottom corners between said sidewalls and said flat bottom.

Reference Chen et al. (US 6,656,019)

Chen shows a CMP pad having grooves. See (Abstract, see claim 1). Chen does not refer to “retaining ring” or “ring” anywhere in the patent.

Combination of Kajiwara and Chen is improper

The combination of Kajiwara and Chen is improper because Kajiwara involves retaining rings and Chen involves CMP pads. Second, the combination could only be done using hindsight. Third, the patent solve different problems and both solve different problems that the applicant’s claims. Fourth, if it was obvious, the applicant’s claims would have been done before. CMP retaining ring art is very crowded and old. Yet no reference suggest the combination or the applicant’s claims.

The modification of Kajiwara with Chen does not meet applicant’s claims

The Office action (section 3) states

S/N 10/ 720,409
Applicant Feng Chen
Reply to the Office action (#2) dated 04 Nov 2005

Page 16
Attorney Docket: CS03-039

Kajiwara et al. meets all of the limitations of the above claims, except for disclosing a flat bottom. Chen et al. teaches groove for delivering slurry of varying shapes. It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to modify the invention of Kajiwara et al. with different shapes, i.e., S3 as taught by Taylor to avoid accumulation of debris (Chen et at. 10:08-13).

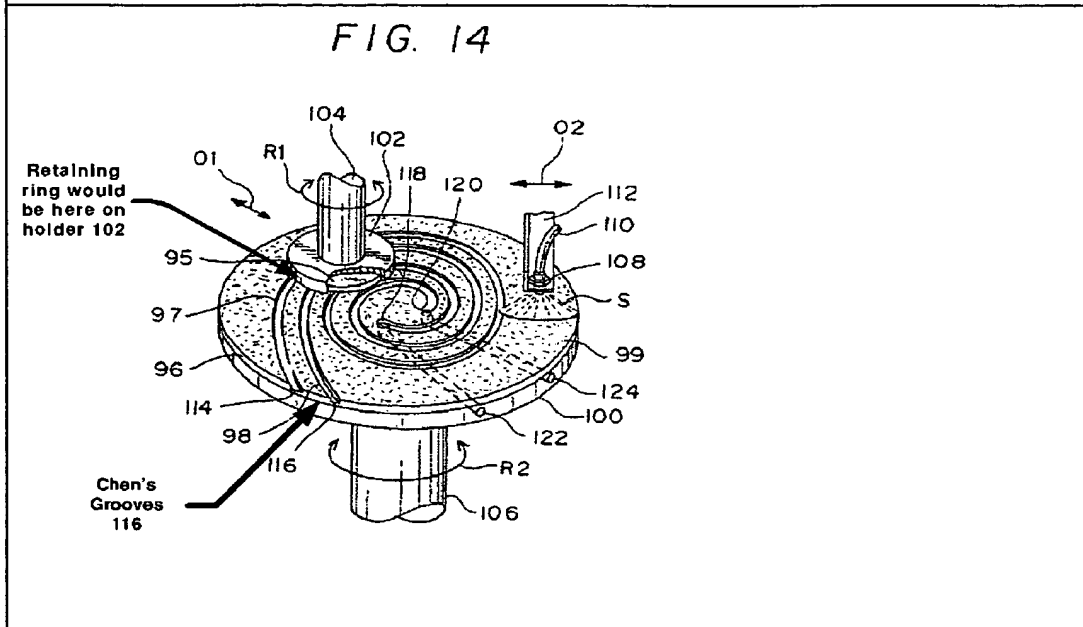
Applicant respectfully posits that this is a misinterpretation of Chen (Chen et at. 10:08-13). Chen shows merely grooves in a CMP pad. No where in Chen does Chen discuss retaining rings. Chen make no suggesting to put grooves in retaining rings. Moreover, Chen figure 14 teaches against putting grooves into retaining rings by showing a cut away view of a CMP holder 102 that does not have any grooves in the surface that contacts the CMP pad.

S/N 10/ 720,409
 Applicant Feng Chen
 Reply to the Office action (#2) dated 04 Nov 2005

Page 17
 Attorney Docket: CS03-039

Chen (Marked up) figure 14 clearly shows Chen's grooves are in the CMP pad, not in a retaining ring.

Fig 14 has added text labels added by the attorney



Furthermore, Chen figure 13, and especially the Chen (10:08-14) cited by the office action, clearly point out the grooves are in the CMP pad. Figure 13 shows merely grooves in a CMP pad.

Therefore, the applicants' parent claims are non-obvious over Chen et al.

Dependent Claims 5, 9, 12, 13, 15, 19, 22-24, 26, 31, 32, 34 and 36 are non-obvious

Claims dependent from parent claim 1 state:

5. (PREVIOUSLY PRESENTED) The CMP retaining ring of claim 1 wherein said groove has curved sidewalls with a curved cross sectional shape, rounded bottom corners and a flat horizontal bottom; the rounded bottom corners are between said flat

S/N 10/ 720,409
Applicant Feng Chen
Reply to the Office action (#2) dated 04 Nov 2005

Page 18
Attorney Docket: CS03-039

horizontal bottom and said curved sidewalls.

7. (ORIGINAL) The CMP retaining ring of claim 1 wherein said groove has rounded top corners adjacent to the lower surface of said retaining ring.
9. (ORIGINAL) The CMP retaining ring of claim 1 wherein said groove has a width between 1 mm and 30 mm; said groove has a depth between 1 and 15 mm.
10. (PREVIOUSLY PRESENTED) The CMP retaining ring of claim 1 wherein said groove is comprised of:
rounded top corners near the lower surface of the ring;
said sidewalls are about vertical and flat.
12. (CURRENTLY AMENDED) The CMP retaining ring of claim 1 wherein said groove has straight sidewalls, top corners, said rounded bottom corners, and an about horizontal bottom; said rounded bottom corners are rounded or curvilinear; said rounded bottom corners are adjacent to said horizontal bottom and said straight sidewalls.
13. (PREVIOUSLY PRESENTED) The CMP retaining ring of claim 1 wherein said retaining ring further comprises other channels; the lower surface of the retaining ring further comprises a plurality of protrusions and recesses or a mixture of both.
28. (PREVIOUSLY PRESENTED) The CMP retaining ring of claim 1 wherein said sidewalls are flat sloped sidewalls;
said groove is comprised of two rounded bottom corners between the sidewalls and the flat bottom;
said groove has a rounded top corner near the lower surface of the ring.
29. (PREVIOUSLY PRESENTED) The CMP retaining ring of claim 1 wherein said groove is comprised of rounded top corners, flat sloped sidewalls; a flat horizontal bottom, two rounded bottom corners between said flat sloped sidewalls and the flat horizontal bottom;
the rounded top corners are adjacent the lower surface of the ring.

The parent claims 14 and 30 have similar dependent claims.

Dependent Claims 5, 9, 12, 13, 15, 19, 22-24, 26, 31, 32, 34 and 36 are non-obvious because Chen does not suggest the limitations in the parent claims (eg., bottom rounded corners and flat bottom). Further, it is non-obvious to modify Kajiwara and Chen's CMP pad to meet applicant's dependent claims.

S/N 10/ 720,409
Applicant Feng Chen
Reply to the Office action (#2) dated 04 Nov 2005

Page 19
Attorney Docket: CS03-039

The Office action section 3, states:

Regarding curved and slanted sidewalls, Kajiwara et al. as modified by Chen et al., meets all the limitations, embodiments disclosed in Kajiwara et al., however, as indicated above it has been held that changing shape, dependent on work-piece parameters, involves only routine skill in the art. *In re Stevens*, 101 US PQ 284(CCPA1 954). And further It would have been obvious to one having ordinary skill in the art at the time the invention was made to make the sidewall curved to enhance prevention of accumulation, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Applicant respectfully disagrees. First, as discussed above, Chen teaches a groove in CMP pad. It is critical to understand as those skilled in the art do that a CMP pad is distinctly different than a retaining ring. For example a CMP pad is soft and pliable. In contrast a retaining ring is hard and retains the wafer. Any modifications of the CMP pad and retaining ring cause different results because of the different properties and functions. Second, applicant respectfully disagrees that it is would be "routine optimum or workable range" to meet the claimed shapes (e.g., curved and slanted sidewalls) because there is no suggesting or guidance in either Kajiwara or Chen to indicate that a curved sidewalls of a groove **in a retaining ring** can be optimized to enhance "enhance prevention of accumulation" in the **retaining ring groove**. Kajiwara solves another problem and therefore would results in a different shape. Chen teaches away from grooves in a retaining ring by teaching grooves in CMP pads to remove accumulation from CMP pad groove and showing a non-grooved wafer holder 102 (fig 14).

The claimed size limitations are not obvious

The Office Action section 3 states:

Modification with regards to particular size is considered obvious to one of ordinary skill in the art as indicated in the pervious office action.

S/N 10/ 720,409
Applicant Feng Chen
Reply to the Office action (#2) dated 04 Nov 2005

Page 20
Attorney Docket: CS03-039

Applicant respectfully disagrees. As discussed above, the reference are solving different problems and therefore the size parameters would be optimize to different sizes that the applicants claimed ranges.

The rejection of Claims 7, 10, 12, 21, 25, 27-29, 33 and 35 under 35 U.S.C. 103(a) as being unpatentable over Prior Art (modified Kajiwara et al. alone and/or in view of Chen et al.) as applied to claims 1 and 14 above, and further in view of Taylor (6,869,335).

The rejection of Claims 7, 10, 12, 21, 25, 27-29, 33 and 35 under 35 U.S.C. 103(a) as being unpatentable over Prior Art (modified Kajiwara et al. alone and/or in view of Chen et al.) as applied to claims 1 and 14 above, and further in view of Taylor (6,869,335) is acknowledged. Reconsideration and withdrawal of the rejection is respectfully requested in view of the amendments.

As discussed above the parent claims are non-obvious. Therefore the dependent claims are non-obvious.

The combination of Kajiwara et al. and Chen et al.) and Taylor (6,869,335) is improper

The combination of Kajiwara et al. and Chen et al. and Taylor (6,869,335) is improper. The patents are complete to themselves and do not suggest combination. The patent solve different problems. By modification of the groove shapes in an attempt to meet applicants claims, the patents would fail or reduce achieving the goal of the individual patent. This combination could only be done with the benefit of hindsight.

The combination of Taylor and Kajiwara is improper because it is not obvious to combine. Neither references suggest combination. Neither patent solves the same problem. Kajiwara does not attempt to reduce pad wear. This combination can only be done with hindsight.

S/N 10/ 720,409
Applicant Feng Chen
Reply to the Office action (#2) dated 04 Nov 2005

Page 21
Attorney Docket: CS03-039

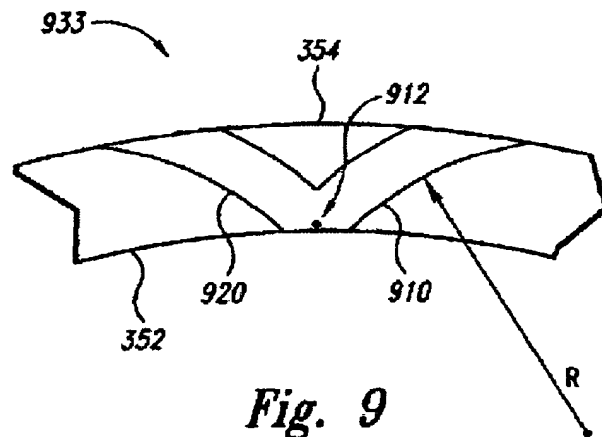
The office action section 4 states:

Taylor teaches that the corners of the grooves contacting the pad can be beveled or rounded. It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to modify the invention Prior Art with semicircular profiles as taught by Taylor to avoid excessive wear of the pad (Taylor 05:32-34).

Regarding claims 3, 7 and 20, Kajiwara et al. as modified by Taylor meets the limitations, e.g., rounded top corner.

Regarding claims 11 and 12, Kajiwara et al. as modified by Taylor meets the limitations, i.e., rounded top corner for the embodiments of Fig. 10B.

However, Taylor is a weak reference and may be mis-interpreted. Taylor col.5, LL 32 - 34. states the "Furthermore, the intersection of the first surface 350 and a side wall 480 in the grooves 400 can be beveled or rounded to avoid excessive wear to the planarizing pad 340 (FIG. 2)." Taylor does not explain what this means. The only figure of Taylor showing a curved intersection is figure 9 .



Therefore the claims are non-obvious.

PENDING CLAIMS

S/N 10/ 720,409
Applicant Feng Chen
Reply to the Office action (#2) dated 04 Nov 2005

Page 22
Attorney Docket: CS03-039

It is believed that all the pending claims have been addressed.

However, the absence of a reply to a specific rejection, issue or comment does not signify agreement with or concession of that rejection, issue or comment. In addition, because the arguments made above may not be exhaustive, there may be reasons for patentability of any or all pending claims (or other claims) that have not been expressed. Finally, nothing in this paper should be construed as an intent to concede any issue with regard to any claim, except as specifically stated in this paper. and the amendment of any claim does not necessarily signify concession of the unpatentability of the claim prior to its amendment.

S/N 10/ 720,409
Applicant Feng Chen
Reply to the Office action (#2) dated 04 Nov 2005

Page 23
Attorney Docket: CS03-039

CONCLUSION

In conclusion, reconsideration and withdrawal of the rejections are respectfully requested. Allowance of all claims is requested. Issuance of the application is requested.

It is requested that the Examiner telephone the undersigned attorney at (215) 670-2455 should there be anyway that we could help to place this Application in condition for Allowance.

Charge to Deposit Account

The commissioner is hereby authorized to apply any fees or credits in this case, which are not already covered by check or credit card, to Deposit Account No. 502018 referencing this attorney docket. The Commissioner is also authorized to charge any additional fee under 37 CFR §1.16 and 1.17 to this Deposit Account.

Respectfully submitted,

Date: Jan 4, 2005

/William J. Stoffel/

William J. Stoffel Reg. No. 39,390
215-670-2455
Customer number 30402

Stoffel Law Office
1735 Market St - Ste A455
Philadelphia, PA 19103-7502 USA
Telephone: 215-670-2455
Fax: 267-200-0730

***** END OF FAX or document - LAST PAGE *****

Computer file info: cs03-039-roa2 dated 2005-11-04.doc file size: 235520